Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

What is claimed is:

1. (Currently Amended) A method for plasma processing, comprising the steps ~~actions~~ of:

~~(a.)~~ generating a substantially ~~an~~ electron-free ion-ion plasma in proximity to at least one substrate; and

~~(b.) controlling~~ applying a bias signal having signal components of alternating positive and negative polarities to said substrate, at times when said ion-ion plasma is present, to induce bombardment of said substrate by both negative and positive ions. ~~of desired polarity and energy, with substantially no electron bombardment.~~

2. (Currently Amended) The method of Claim 1, wherein said plasma is generated in a chamber ~~contains~~ containing a gas phase having high net electron affinity.

3. (Currently Amended) The method of Claim 1, wherein said ~~bias signal controls an AC bias~~ ion-ion plasma has positive and negative charge densities that are substantially equal.

4. (Currently Amended) A method for plasma processing, comprising the steps ~~actions~~ of:

~~(a.)~~ periodically ~~repeatedly~~ applying power pulses to a chamber[,] to selectively ~~thereby~~ increase the total ion density therein ~~inside said chamber~~; and

~~(b.) and, AFTER~~ after a delay period following one of said power pulses, ~~AND AFTER sufficient time for the electron density to drop to less than 1/200th of the positive ion density,~~ applying a bias signal having alternating positive and negative polarities to a substrate, to induce ~~ion~~ bombardment of said substrate~~;~~ at different times with both negative and positive ions.

~~wherein said sufficient time substantially prevents bombardment of said substrate by free electrons during said action (b.).~~

5. (Original) The method of Claim 4, wherein said chamber contains a gas phase having high net electron affinity.

6. (Original) The method of Claim 4, wherein said pulses oscillate between a maximum level of power which increases plasma density and a nonzero minimum level which allows electron attachment.

7. (Original) The method of Claim 4, wherein said bias signal is modulated at a frequency which is integrally related to the switching frequency of said power pulses.

8. (Original) The method of Claim 4, wherein said power pulses are pulses of RF power.

9. (Currently Amended) The method of Claim 4, wherein said ~~bias voltage is applied with both positive and negative polarities, to induce bombardment at different times with both negative and positive ions.~~ delay period is selected to end at a time when electron density in said chamber has dropped below a specified threshold.

10. (Original) The method of Claim 4, wherein said power pulses are pulses of RF power.

11. (Currently Amended) The method of Claim 4, wherein said power pulses are pulses of RF power, and wherein said bias signal ~~controls AC bias at~~ has a frequency lower than ~~said RF power in~~ the frequency of said power pulses.

12. (Original) The method of Claim 4, wherein said bias signal is phase-locked to said power pulses.

13. (Currently Amended) The method of Claim [4] 9, wherein said ~~bias signal controls an AC bias.~~ specified threshold for said electron density is on the order of $1/200^{th}$ of the positive ion density in said chamber.

14. (Currently Amended) A method for surface modification by negative ion bombardment, comprising the ~~actions~~ steps of:

~~(a.)~~ generating ~~a~~ approximately equal populations of positive and negative ions in proximity to a substrate; and

~~(b.)~~ applying a bias signal having signal components of alternating positive and negative polarities, to induce bombardment of said substrate by ~~said negative ions, but only at times when said negative ions outnumber free electrons by more than 200 to 1; whereby self-biasing of said substrate is prevented.~~ ions of both said populations during time periods when the number of free electrons proximate to said substrate is less then a specified fraction of the number of ions in one of said populations.

15. (Currently Amended) The method of Claim 14, wherein said populations are generated in a chamber ~~contains~~ containing a gas phase having high net electron affinity.

16. (Currently Amended) The method of Claim 14, wherein said bias ~~voltage~~ signal is applied ~~with both positive and negative polarities,~~ to induce bombardment at different times with both negative and positive ions.

17. (Currently Amended) The method of Claim 14, wherein said ~~power pulses are~~ ion populations are generated by means of pulses of RF power.

18. (Currently Amended) The method of Claim 14, wherein said ~~bias signal controls an AC bias.~~ specified fraction is $1/200^{th}$.

19. (Currently Amended) A method for plasma processing, comprising the ~~actions~~ steps of:

~~(a.)~~ applying power pulses ~~to a chamber, using~~ defining an intensity modulation waveform to a chamber, to thereby increase the positive and negative ~~total~~ ion ~~density~~ densities in said chamber;

~~(b.) and~~ applying a bias signal~~;~~ having alternating positive and negative polarities ~~whose envelope is synchronized to said modulation waveform,~~ to a substrate~~;~~ , said bias signal defining an envelope; and

~~wherein~~ imposing a delay ~~is imposed,~~ between at least some trailing edges of said modulation waveform and the respective next leading edges of said bias signal envelope, ~~which is~~ said delay being sufficient ~~for~~ to cause the free electron density to become ~~fall to~~ less than a specified fraction ~~0.5%~~ of the positive ion density inside said chamber.

20. (Currently Amended) The method of Claim 19, wherein said chamber contains a gas phase having high net electron affinity, and said specified fraction is 0.5%.

21. (Currently Amended) The method of Claim 19, wherein said power pulses oscillate between a maximum level of power which increases plasma density and a nonzero minimum level which allows electron attachment.

22. (Original) The method of Claim 19, wherein said bias signal is modulated at a frequency which is integrally related to the switching frequency of said power pulses.

23. (Original) The method of Claim 19, wherein said power pulses are pulses of RF power.

24. (Currently Amended) The method of Claim 19, wherein said bias signal ~~voltage~~ is applied ~~with both positive and negative polarities,~~ to induce bombardment at different times with both negative and positive ions.

25. (Canceled).

26. (Currently Amended) The method of Claim 19, wherein said power pulses are pulses of RF power, and wherein said bias signal ~~controls AC bias at~~ has a frequency lower than ~~said RF power in~~ the frequency of said power pulses.

27. (Original) The method of Claim 19, wherein said bias signal is phase-locked to said power pulses.

28. (Canceled).

29. (Canceled).

30. (Canceled).

31. (Original) A method for plasma processing, comprising the actions of:

(a.) generating an electron-free ion-ion plasma in proximity to at least first and second substrates; and

(b.) applying different respective bias signals to said substrates, at times when said ion-ion plasma is present, to induce bombardment of said first substrate by ions of desired chemistry and energy, with substantially no electron bombardment, and

to regulate the voltage and/or composition of said plasma by ion bombardment of said second substrate.

32. (Currently Amended) The method of Claim 31, wherein said ion-ion plasma is generated in a chamber ~~contains~~ containing a gas phase having high net electron affinity.

33. (Withdrawn).

34. (New) The method of Claim 31, wherein:

said ion-ion plasma is generated by applying power pulses to a chamber.

35. (New) The method of Claim 34, wherein said power pulses oscillate between a maximum level of power which increases plasma density and a nonzero minimum level which allows electron attachment.

36. (New) The method of Claim 34, wherein said power pulses are pulses of RF power.

37. (New) The method of Claim 31, wherein said bias signals are applied to induce bombardment at different times with both negative and positive ions.